Design Principles for Engineering of Tissues from Human Pluripotent Stem Cells.

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Public Summary:
Recent advances in human pluripotent stem cell (hPSC) technologies have enabled the engineering of human tissue constructs for developmental studies, disease modeling, and drug screening platforms. In vitro tissue formation can be generally described at three levels of cellular organization. Multicellular hPSC constructs are initially formed either with polymeric scaffold materials or simply via self-assembly, adhesive mechanisms. Heterotypic interactions within hPSC tissue constructs can be achieved by physically mixing independently differentiated cell populations or coaxed to simultaneously co-emerge from a common population of undifferentiated cells. Higher order tissue architecture can be engineered by imposing external spatial constraints, such as molds and scaffolds, or depend upon cell-driven organization that exploits endogenous innate developmental mechanisms. The multicellular, heterogeneous, and highly organized structure of hPSC constructs ultimately dictates the resulting form and function of in vitro engineered human tissue models.

Scientific Abstract:
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